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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/536,952	05/31/2005	David Andrew Alexander Faulkner	05-453	1015

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EXAMINER	
NEGRON, WANDA M	

ART UNIT	PAPER NUMBER
2622	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/536,952	FAULKNER ET AL.	
	Examiner	Art Unit	
	WANDA M. NEGRON	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7-9,11,12,15,16 and 19-21* is/are rejected.

7)☐ Claim(s) *5,6,10,13,14,17 and 18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 May 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

The listing of references in the specification is not a proper information disclosure statement (see, *e.g.*, page 2, line 10 of specification as filed). 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

> Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and

> Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.
>
> When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare In re Lowry, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and Warmerdam, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).
>
> In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

Claim 21 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claim 21 defines a "computer program designed to run on a computer" embodying functional descriptive material. However, the claim does not define a computer-readable medium or memory and is thus non-statutory for that reason (i.e., "When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized" – Guidelines Annex IV). That is, the scope of the presently claimed "computer program designed to run on a computer" can range from paper on which the program is written, to a program simply contemplated and memorized by a person.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4, 16 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Egusa et al. (US Patent No. 5,237,405), hereinafter referred to as Egusa, and further in view of Kondo et al. (EP Application Publication No. 0560610 A2), hereinafter referred as Kondo.

Regarding **claim 1**, Egusa discloses a video image stabilisation system for correction of camera motion (see col. 1, lines 7-12), that is arranged to receive one or more signals representative of a plurality of images (see col. 46, lines 12-14) from an image source wherein the system is arranged to estimate a Global Motion Offset (GMO) value between image n and a previous image representative of the spatial separation between the scene imaged in image n and the previous image (*i.e.*, a motion vector for an image is determined on the basis of the difference between two consecutives image fields; see col. 46, lines 20-25 and col. 47, lines 13-16), and apply a corrective movement to the image n based upon this GMO (*i.e.*, a motion vector is applied to the screen image; see col. 47, lines 13-16), characterised in that the system is arranged to estimate the GMO for the image n with reference to a mask that represents a region or regions of the image n not to be considered in the GMO estimation, the region(s) being region(s) estimated as likely to mislead the estimation of the GMO (*i.e.*, the motion vector for the screen image is calculated on the basis of a weighting process wherein,

e.g., an unreliable region is given a zero (0) weight coefficient; see figure 77 and col. 47, lines 1-16).

Egusa, however, does not explicitly disclose that an image n follows at least an image (n-1) *and an image (n-2)*. The concept of processing time-sequentially continuous field picture images to obtain a motion vector is well known in the art as evidenced by Kondo (see figure 12 and col. 15, lines 14-20). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a video image stabilization system wherein an image n follows at least an image (n-1) and an image (n-2) because a user would be able to process for stabilization a moving picture or still pictures captured in a continuous shooting mode.

Regarding **claim 2**, Egusa in view of Kondo discloses that the system is arranged to examine one or more local regions of the image n and corresponding local regions of a previous image, and estimate a local motion offset (LMO) representative of spatial separation between like features in corresponding local regions of the current and previous images, and if the, or each, LMO is greater than a given threshold, to set area(s) of the mask that correspond to this local region or regions to indicate omission from the GMO estimation (*i.e.*, a motion vector V_k and its associated weight coefficient a_k are calculated for each detecting region, and when the coefficient is zero (0), the motion vector V_k is not taken into account when calculating the motion vector of the image screen; see figure 77 and col. 46, lines 11-68).

Method **claims 19 and 20** are drawn to the method of using the corresponding apparatus claimed in claims 1 and 2. Therefore method claims 19 and 20 correspond to apparatus claims 1 and 2 and are rejected for the same reasons of obviousness as used above.

Claim 21 is drawn to a computer program designed to run on a computer and arranged to implement a video image stabilisation system corresponding to the method of using the corresponding apparatus claimed in claim 1. Therefore claim 21 corresponds to method of using the corresponding apparatus claimed in claim 1 and is rejected for the same reasons of obviousness as used above.

Regarding **claim 3**, in view of Kondo discloses that the local regions comprise an array of rectangular regions (see figure 77).

Regarding **claim 4**, official notice is taken that an image with a lower resolution is processed faster than the same image with a higher resolution. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to arrange the system disclosed by Egusa in view of Kondo to estimate the GMO of an image representative of image n but having a spatial resolution lower than image n because image processing for motion detection would be faster.

Regarding **claim 16**, Egusa in view of Kondo discloses that anomalous pixels of the image n (*i.e.*, pixels that maybe regarded as noise because of lack of image information; see Kondo, col. 15, lines 29-39 and figure 13) are used to set corresponding pixels of the mask such that they are excluded from the estimation of the GMO (*i.e.*, areas comprising pixels that maybe regarded as noise because of lack of image information should be eliminated; see Kondo, col. 15, lines 36-39).

Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Egusa in view of Kondo, as applied to claims 1 and 2 above, and further in view of Jones (EP Application Publication No. 1117251 A1).

Regarding **claim 7**, as mentioned in the discussion of claims 1 and 2 above, Egusa in view of Kondo discloses all the limitations of the parent claim. Egusa in view of Kondo, however, fails to teach that the system is arranged to adjust the GMO if intentional adjustment of the image source viewing direction (pan) or field of view (zoom) is detected.

Jones, on the other hand, discloses stabilizing an input frame by extracting unwanted motion while preventing removal of the desired camera motions (*i.e.*, filtering an average translation vector; see paragraphs [0027]-[0029], and steps 106 and 107 in figure 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to adjust the GMO in the invention of Egusa in view of Kondo if intentional adjustment of the image source viewing direction (pan) or field of view

(zoom) is detected in order to remove unwanted camera jitter while preserving desired camera motion.

Regarding **claim 8**, Egusa in view of Kondo and Jones discloses that the system is arranged to detect a pan of the image source by means of low-pass filtering GMO values from at least a sequence of previous images (*i.e.*, filtering over a number of frames an average translation vector using a low-pass filter "to extract the desired low frequency motion"; see Jones, paragraphs [0028]-[0029]). It would be inherent to use a low-pass filter having a cut-off frequency lower than that expected from unintentional camera movements in order to efficiently cutoff those "unintentional camera movements".

Claims 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Egusa in view of Kondo and Jones, as applied to claims 7 and 8 above, and further in view of Tucker et al. (*Image Stabilization for a Camera on a Moving Platform*, Proceedings of IEEE Pacific Rim Conference on Communications, Computers and Signal Processing, Vol. 2, pp 734-737, May 1993), hereinafter referred to as Tucker.

Regarding **claim 9**, as mentioned in the discussion of claims 7 and 8 above, Egusa in view of Kondo and Jones discloses all the limitations of the parent claim. Egusa in view of Kondo and Jones, however, fails to teach that a zoom is detected if a

number x of LMOs examined for image n all show a direction of movement in towards a central region of the image n, or all show a direction of movement away from a central region of the image n, the number x being greater than some given threshold.

Tucker, on the other hand, discloses that in order to detect a scaling motion, an image must be divided in into at least four regions wherein the motion vectors due to scaling show a direction of movement away from a central region of the image (see figure 2). Those ordinarily skilled artisans in the relevant art will recognize that a direction of movement away from a central region of the image describes a scaling up process, while a direction of movement in towards a central region of the image describes a scaling down process.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to detect a zooming motion by detecting if at least four LMOs examined for an image n, all show a direction of movement in towards a central region of the image n, or all show a direction of movement away from a central region of the image n since a person with ordinary skill has good reason to pursue the known options within his or her technical grasp if this leads to the anticipated result of detecting a zooming motion.

Regarding **claim 11**, it would have been an obvious matter of design choice to examined the LMOs from those local regions that are substantially adjacent the edge of image n since the applicant has not disclosed that examining the LMOs from those local regions that are substantially adjacent the edge of image n solves any stated problem or

is for any particular purpose and it appears that the invention would perform equally well with examination of the LMOs from all local regions of image n.

Claims 12 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Egusa in view of Kondo, and further in view of Green et al. (US Patent No. 4,403,256), hereinafter referred to as Green.

Regarding **claim 12**, mentioned in the discussion of claim 1 above, Egusa in view of Kondo discloses all the limitations of the parent claim. Egusa in view of Kondo, however, fails to teach that the system is arranged to generate a border on at least one edge of the image n, the border being adjustable in size such that it covers any blank space between the edge of image n and the corresponding edge of a display area on which the image n is displayed.

Green, on the other hand, discloses cropping an image for stabilization purposes “by as much as about 6.6% of the active picture height and width”, and performing an optional electronic zoom process (see col. 16, lines 60-68).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to crop the input image of Egusa in view of Kondo for stabilization purposes in order to eliminate unsteadiness without destroying intentional camera motion (see col. 3, lines 10-15).

It would be inherent that, if the cropped image does not have a "normal full height and width" and the optional zoom process is not performed, then a border would have to

be present in order to delimit the cropped image without zoom, the border being adjustable since the picture could be cropped between 0-6.6% of the original image.

Regarding **claim 15**, as mentioned in the discussion of claim 1 above, Egusa in view of Kondo discloses all the limitations of the parent claim. Egusa in view of Kondo, however, fails to teach that the system is arranged to scale the image n, such that it covers any blank space between the edge of image n and the corresponding edge of a display area on which the image n is displayed.

The concept and the advantage of scaling an image such that it covers any blank space between the edge of image and the corresponding edge of a display area on which the image is displayed is old and well known in the art, as evidenced by Green (see col. 11, lines 5-14).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to scale an image such that it covers any blank space between the edge of image and the corresponding edge of a display area on which the image is displayed so that the home viewer does not see the blanking introduced by the stabilization process.

Allowable Subject Matter

Claims 5, 6, 10, 13, 14, 17 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding **claim 5**, the prior art fails to disclose or reasonably suggest a video stabilization system that is arranged to iterate the estimation of the GMO on a plurality of images each representative of image n, ***where each of the plurality of images has a different spatial resolution***.

Regarding **claim 6**, the prior art fails to disclose or reasonably suggest a video stabilization system that is arranged to adjust the GMO if a stationary camera state is detected, ***this state being indicated by means of a plurality of contiguous GMOs including the current GMO all being below a given threshold***.

Regarding **claim 10**, the prior art fails to disclose or reasonably suggest a video stabilization system ***wherein the threshold is 50% of those LMOs examined, and the number x is proportional to the absolute difference between the number of those LMOs examined showing a direction of movement in towards a central region of the image n, and those LMOs examined showing a direction of movement away from a central region of the image n***.

Regarding **claim 13**, the prior art fails to disclose or reasonably suggest a video stabilization system wherein the system is arranged to adjust the border size on at least

one edge of the image n such that it also covers an area on image n ***corresponding to blank space present on one or more previous images***.

Regarding **claim 14**, the prior art fails to disclose or reasonably suggest a video stabilization system wherein ***the border generated by the system comprises of image data from one or more previous images***.

Regarding **claim 17**, the prior art fails to disclose or reasonably suggest a video stabilization system wherein ***the pixels above a threshold in an image comprising the absolute difference between the image n and a previous image m, both images n and m having had corrective movements applied, are regarded as anomalous***.

Regarding **claim 18**, the prior art fails to disclose or reasonably suggest a video stabilization system wherein the system is ***arranged to multiply the calculated GMO***, as adjusted in any other operation, ***by a decay constant factor lying between 0 and 1 before shifting the image n***.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Sekine et al. (US Patent No. 6,049,354) disclose an image processing system for correcting image-shake using motion vectors.
- Iu et al. (US Patent No. 6,628,715) disclose an apparatus for generating an image motion vector field by iteratively comparing a predicted image with a second image frame.
- Soupliotis et al. (US Patent No. 7,167,199) disclose a video enhancement system wherein motion estimation includes computing global motion and local motion.
- Kutka (US Patent No. 7,221,390) discloses a correction system wherein motion estimation is carried out for the current image and a predetermined number of previous images by determining an image motion vector.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WANDA M. NEGRON whose telephone number is (571) 270-1129. The examiner can normally be reached on Mon-Fri 6:30 am - 4:00 pm alternate Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Ometz can be reached on (571) 272-7593. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Wanda M. Negrón/
Examiner, Art Unit 2622
May 20, 2008

/David L. Ometz/
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